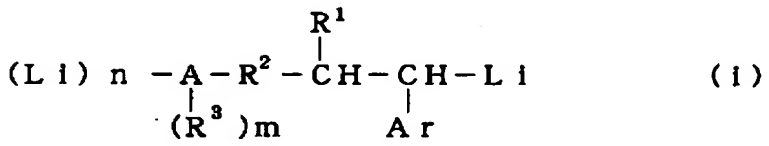
CLAIMS

1. A method for producing an end-functionalized polymer, wherein an anionically polymerizable monomer is anionically polymerized by using, as a polymerization initiator, an organolithium compound represented by the following general formula (i);
[Formula 13]

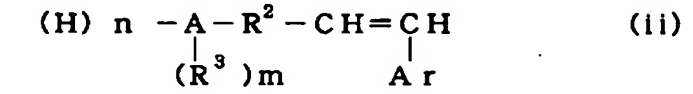


(i)

wherein: A represents a heteroatom selected from among an oxygen atom, a nitrogen atom, a sulfur atom, and a phosphorus atom; Ar represents an optionally substituted aryl group; R^1 represents a C_{1-10} alkyl group; R^2 represents a C_{1-10} alkylene group; R^3 represents a C_{1-10} alkyl group or a protective group for the functional group -A-H (A is the heteroatom); and when the heteroatom A is an oxygen atom or a sulfur atom, then m and n are 0 or 1 respectively and the sum of m and n is 1, and when the heteroatom A is a nitrogen atom or a phosphorus atom, then m and n are 0, 1, or 2 respectively and the sum of m and n is 2.

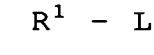
2. A method for producing an end-functionalized

polymer, wherein a β-substituted styrene derivative represented by the following general formula (ii); [Formula 14]



(ii)

wherein: A represents a heteroatom selected from among an oxygen atom, a nitrogen atom, a sulfur atom, and a phosphorus atom; Ar represents an optionally substituted aryl group; R^2 represents a C_{1-10} alkylene group; R^3 represents a C_{1-10} alkyl group or a protective group for the functional group -A-H (A is the heteroatom); and when the heteroatom A is an oxygen atom or a sulfur atom, then m and n are 0 or 1 respectively and the sum of m and n is 1, and when the heteroatom A is a nitrogen atom or a phosphorus atom, then m and n are 0, 1, or 2 respectively and the sum of m and n is 2, is reacted with an organolithium compound represented by the following general formula (iii);



(iii),

wherein R^1 represents a C_{1-10} alkyl group, while the amount of the organolithium compound represented by the general formula (iii) is controlled to more than n moles (here, n represents the same numeral as n expressed in the general formula (ii)) per one mole

of the β-substituted styrene derivative represented by the general formula (ii), and thereafter an anionically polymerizable monomer is anionically polymerized under the existence of the obtained reaction product mixture.

3. The production method according to Claim 2, wherein the β-substituted styrene derivative represented by the general formula (ii) is reacted with the organolithium compound represented by the general formula (iii), while the amount of the organolithium compound is controlled to more than n moles to not more than (n+1) moles (here, n represents the same numeral as n expressed in the general formula (ii)) per one mole of the β-substituted styrene derivative, and thereafter an anionically polymerizable monomer is anionically polymerized under the existence of the obtained reaction product mixture.

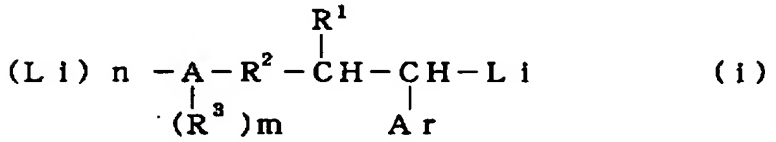
4. The production method according to any one of Claims 1 to 3, wherein the production method further includes a process of reacting the living anionic chain end of the produced end-functionalized polymer with at least one kind of functional capping agent selected from among an alkylene oxide compound, a carbonyl compound, an imine compound, a mercapto

compound, and epichlorohydrin.

5. The production method according to any one of Claims 1 to 3, wherein the production method further includes a process of reacting a multi-functional coupling agent with the living anionic chain end.

6. A functionalized anionic polymerization initiator represented by the following general formula (i);

[Formula 15]



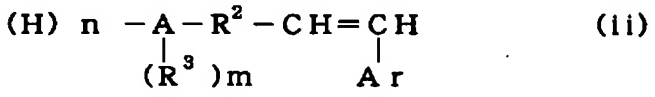
(i)

wherein: A represents a heteroatom selected from among an oxygen atom, a nitrogen atom, a sulfur atom, and a phosphorus atom; Ar represents an optionally substituted aryl group; R^1 represents a C_{1-10} alkyl group; R^2 represents a C_{1-10} alkylene group; R^3 represents a C_{1-10} alkyl group or a protective group for the functional group -A-H (A is the heteroatom); and when the heteroatom A is an oxygen atom or a sulfur atom, then m and n are 0 or 1 respectively and the sum of m and n is 1, and when the heteroatom A is a nitrogen atom or a phosphorus atom, then m

and n are 0, 1, or 2 respectively and the sum of m and n is 2.

7. A method for producing a functionalized anionic polymerization initiator, wherein a β-substituted styrene derivative represented by the following general formula (ii);

[Formula 16]



(ii)

wherein: A represents a heteroatom selected from among an oxygen atom, a nitrogen atom, a sulfur atom, and a phosphorus atom; Ar represents an optionally substituted aryl group; R^2 represents a C_{1-10} alkylene group; R^3 represents a C_{1-10} alkyl group or a protective group for the functional group -A-H (A is the heteroatom); and when the heteroatom A is an oxygen atom or a sulfur atom, then m and n are 0 or 1 respectively and the sum of m and n is 1, and when the heteroatom A is a nitrogen atom or a phosphorus atom, then m and n are 0, 1, or 2 respectively and the sum of m and n is 2, is reacted with an organolithium compound represented by the following general formula (iii);

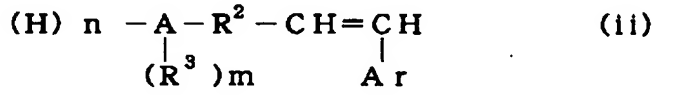
R^1 - Li

(iii),

wherein R^1 represents a C_{1-10} alkyl group, while the amount of the organolithium compound is controlled to more than n moles (here, n represents the same numeral as n expressed in the general formula (ii)) per one mole of the β-substituted styrene derivative.

8. A method for producing a functionalized anionic polymerization initiator, wherein a β-substituted styrene derivative represented by the following general formula (ii);

[Formula 17]



(ii)

wherein: A represents a heteroatom selected from among an oxygen atom, a nitrogen atom, a sulfur atom, and a phosphorus atom; Ar represents an optionally substituted aryl group; R^2 represents a C_{1-10} alkylene group; R^3 represents a C_{1-10} alkyl group or a protective group for the functional group -A-H (A is the heteroatom); and when the heteroatom A is an oxygen atom or a sulfur atom, then m and n are 0 or 1 respectively and the sum of m and n is 1, and when the heteroatom A is a nitrogen atom or a phosphorus atom, then m and n are 0, 1, or 2 respectively and the sum of m and n is 2, is reacted with an organolithium compound represented by the following

general formula (iii);

$$R^1 - Li \quad \text{(iii)},$$

wherein R^1 represents a C_{1-10} alkyl group, while the amount of the organolithium compound is controlled to more than n moles to not more than (n+1) moles (here, n represents the same numeral as n expressed in the general formula (ii)) per one mole of the β-substituted styrene derivative.

9. The end-functionalized polymer produced by the production method according to any one of Claims 1 to 5.